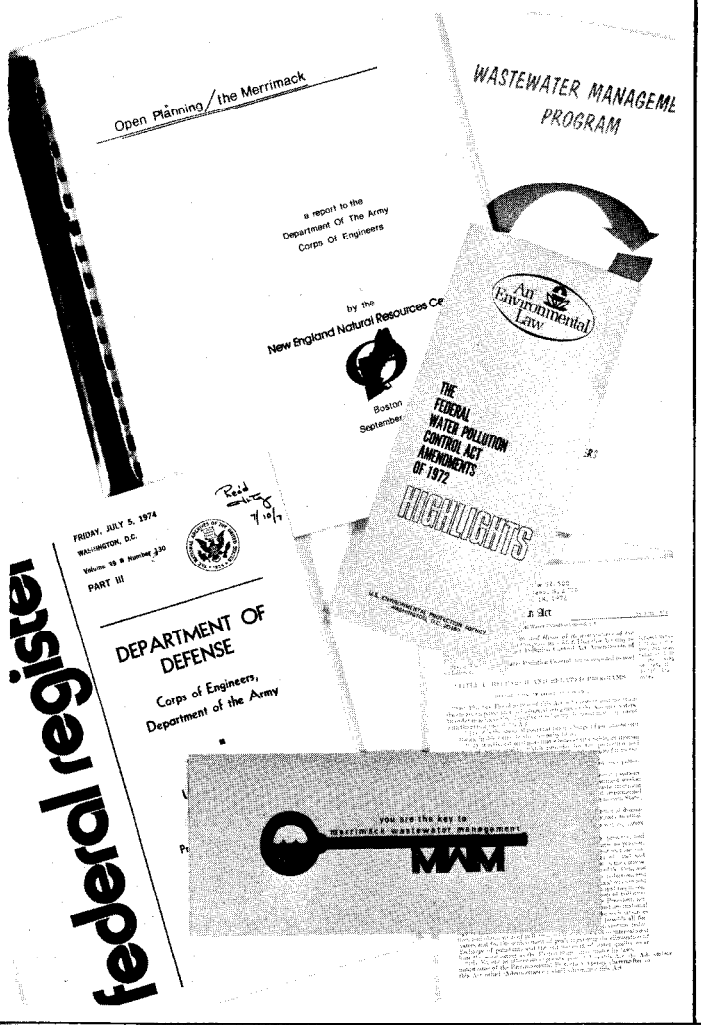
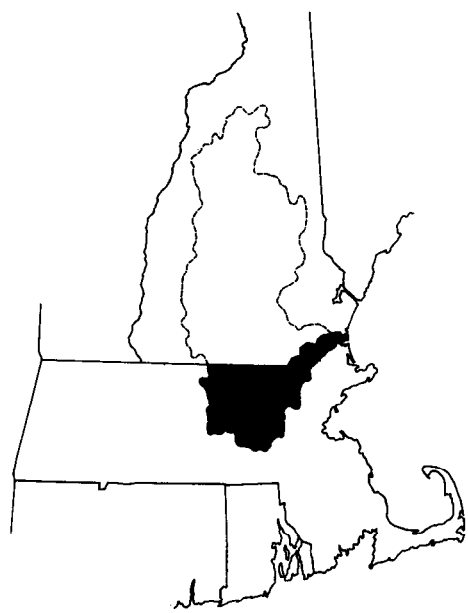
MERRIMACK WASTEWATER MANAGEMENT

key to a clean river



APPENDIX I-C

LIST OF STUDY CRITERIA AND INSTRUCTIONS



NORTHEASTERN UNITED STATES WATER SUPPLY STUDY

NOVEMBER 1974

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF:
NEDPL-W

8 May 1975

Mr. Frank Gregg
New England River Basins Commission
55 Court Street
Boston, Mass. 02108

Dear Mr. Gregg:

Reference is made to the Merrimack Wastewater Management Study authorized by the Congress of the United States and which was jointly conducted by the Commonwealth of Massachusetts, the Regional Planning Agencies in the Massachusetts portion of the basin, the Environmental Protection Agency and the Corps of Engineers.

In compliance with an agreement between the Technical Subcommittee and the various agencies, and cities and towns in the study area, the draft report is being furnished for your review and comment. Inclosure 1 lists the appendices which form the report, and Inclosure 2 is a distribution list.

It is requested that your comments be forwarded to this Division (ATTN: Chief, Planning Division) within 30 days. Comments received will be incorporated into the Comments Appendix (VII) which will be distributed as a part of the overall report.

Sincerely yours,

JOHN H. MASON
Colonel, Corps of Engineers
Division Engineer

3 Incls
1. List of Appendices
2. Distribution List
3. Merrimack Wastewater Mgmt Study Rpt

MAILING LIST

Mr. Regis J. Harrington
Division of Planning
Dept. of Commerce & Development
100 Cambridge Street
Boston, Mass. 02202

Mr. John B. Casazza
Division of Water Pollution Control
100 Cambridge Street
Boston, Mass. 02202

Mr. Charles Kennedy
Water Resources Commission
100 Cambridge Street
Boston, Mass. 02202

Mr. Daniel McGillicuddy
Resources Management Policy Council
Comm. of Massachusetts
18 Tremont Street
Boston, Mass. 02108

Dr. Evelyn F. Murphy
Comm. of Massachusetts
Executive Office of Environmental Affairs
18 Tremont Street
Boston, Mass. 02108

Mr. Arthur Brownell
Commissioner
Department of Natural Resources
100 Cambridge Street
Boston, Mass. 02203

Mr. William J. Byrne
Commissioner
Metropolitan District Commission
20 Somerset Street
Boston, Mass. 02108

Mr. Martin Weiss
Environmental Engineer
Metropolitan District Commission
20 Somerset Street
Boston, Mass. 02108

Mr. Vincent Ciampa
Environmental Affairs
Comm. of Massachusetts
18 Tremont Street
Boston, Mass. 02108

Mr. Richard Young
Division of Water Pollution Control
100 Cambridge Street
Boston, Mass. 02202

Mr. Thomas McMahon
Director
Division of Water Pollution Control
100 Cambridge Street
Boston, Mass. 02202

Mr. John Collins
Director
Dept. of Public Health
Comm. of Massachusetts
600 Washington Street
Boston, Mass. 02111

Mr. David Terry
Dept. of Community Affairs
Comm. of Massachusetts
100 Cambridge Street
Boston, Mass. 02202

Mr. Malcolm Graf
Department of Public Works
Comm. of Massachusetts
100 Nashua Street
Boston, Mass. 02114

Mr. Paul Newman
Chairman, Board of Selectmen
761 Boston Road
Billerica, Mass. 01821

Mr. Gerald Lannan
Chairman, Board of Selectmen
8 Colonial Drive
Chelmsford, Mass. 01824

Mr. Dexter Dutney
Chairman, Board of Selectmen
11 Oliver Drive
Dracut, Mass. 01862

Mr. George Tully
Chairman, Board of Selectmen
Hollis Street
Dunstable, Mass. 01827

Honorable Armand Lemay
Mayor of the City of Lowell
26 Shea Street
Lowell, Mass. 01854

Mr. Harold R. Pillsbury, Jr.
Chairman, Board of Selectmen
Brookline Street
Pepperell, Mass. 01463

Mr. Richard A. Adams, Sr.
Chairman, Board of Selectmen
176 Deering Drive
Tewksbury, Mass. 01876

Mr. Norman A. Dupuis
Chairman, Board of Selectmen
Norris Road
Tyngsborough, Mass. 01879

Mr. Samuel Richards, Jr.
Chairman, Board of Selectmen
38 Old Lowell Road
Westford, Mass. 01886

Mr. Milton Greenberg
Chairman, Board of Selectmen
46 Sagamore Drive
Andover, Mass. 01810

Mr. J. Maynard Austin
Town Manager
Town Hall
20 Main Street
Andover, Mass. 01810

Mr. Henry Fournier
Chairman, Board of Selectmen
240 Elm Street
Amesbury, Mass. 01913

Mr. William Handren
Chairman, Board of Selectmen
199 Pond Street
Georgetown, Mass. 01833

Mr. Leo F Downing
Chairman, Board of Selectmen
4 Anne Street
Groveland, Mass. 01830

Honorable George K. Katsaros
Mayor of the City of Haverhill
City Hall
4 Summer Street
Haverhill, Mass. 01830

Honorable John J. Buckley
Mayor of the City of Lawrence
City Hall
200 Common Street
Lawrence, Mass. 01840

Mr. H. Francis Drenth
Chairman, Board of Selectmen
74 West Main Street
Merrimac, Mass. 01860

Mr. Dana A. Miller
Town Administrator
Town Hall
90 Hampshire Street
Methuen, Mass. 01844

Honorable Byron J. Matthews
Mayor of the City of Newburyport
City Hall
Pleasant Street
Newburyport, Mass. 01950

Mr. John P. Kirk
Chairman, Board of Selectmen
26 Pleasant Street
North Andover, Mass. 01845

Mr. Walter T. Morse
Chairman, Board of Selectmen
Town Hall
Beach Road
Salisbury, Mass. 01950

Mr. Irving A. Burrill
Chairman, Board of Selectmen
Stewart Street
West Newbury, Mass. 01985

Mr. Charles Killam
Chairman, Board of Selectmen
Town Hall
Boxford, Mass. 01921

Mr. Joseph J. Lyons
Chairman, Board of Selectmen
13 Circuit Drive
Rowley, Mass. 01969

Mr. Donald A. George
Chairman
Greater Lawrence Sanitary District
598 Essex Street, P.O. Box 382
Lawrence, Mass. 01840

Mr. Joseph Hannon
Northern Middlesex Area Commission
144 Merrimack Street
Lowell, Mass. 01852

Mr. John Harrington
Metropolitan Area Planning Council
44 School Street
Boston, Mass. 02108

Mr. John Pobst
Montachusetts Regional Planning Commission
150 Main Street
Fitchburg, Mass. 01420

Mr. James Arnold
Central Mass. Regional Planning Agency
70 Elm Street
Worcester, Mass. 01609

Mr. James Gaines
Merrimack Valley Planning Commission
87 Winter Street
Haverhill, Mass. 01830

Mrs. Norman Sevigny
56 Totman Road
Lowell, Mass. 01854

Mrs. Marion Stoddart
Farmers Row
Groton, Mass. 01450

Mr. Nathan Tufts
101 River Road
Merrimack, Mass. 01860

Mrs. Joan Gilliatt
4 Tobey Lane
Andover, Mass. 01810

Mr. Arthur Lamson
22 Lake Attitash
Amesbury, Mass. 01913

Mr. Walter M. Newman, Chief
Water Branch
Environmental Protection Agency
JFK Building
Boston, Mass. 02109

Mr. Kenneth Johnson
Environmental Protection Agency
JFK Building
Boston, Mass. 02108

Mr. John A.S. McGlennon
Regional Administrator
Environmental Protection Agency
Region I
JFK Building
Boston, Mass. 02108

Mr. David Pickman
Environmental Protection Agency
JFK Building
Boston, Mass. 02108

Mr. Floyd Taylor
Environmental Protection Agency
JFK Building
Boston, Mass. 02108

Mr. Frank Gregg
New England River Basins Commission
55 Court Street
Boston, Mass. 02108

Mr. Alfred Peloquin
New England Interstate Water
Pollution Control Commission
607 Boylston Street
Boston, Mass. 02116

Mr. Stephen Poole
Nashua River Program
22 Beacon Street
Fitchburg, Mass. 01420

National Commission on Water Quality
P.O. Box 19266
Washington, D.C. 20036
ATTN: Mr. Joe G. Moore, Jr.

Anderson-Nichols and Co., Inc.
150 Causeway Street
Boston, Mass. 02114
ATTN: Mr. Silbermann

Abt Associates, Inc.
55 Wheeler Street
Cambridge, Mass. 02138
ATTN: Mr. John Willson

Normandeau Associates, Inc.
Nashua Road
Bedford, New Hampshire 03102

Mr. Edward Selig
Bracken and Selig
140 Federal Street
Boston, Mass. 02110

Mr. Lester Klashman
198 Maple Street
Malden, Mass. 02148

Mr. Edward A. Thomas
U.S. Dept. of Housing & Urban
Development
Boston Regional Office
JFK Federal Building
Boston, Mass. 02203

Mr. Richard E. Griffith
Regional Director
Fish & Wildlife Service
U.S. Dept. of the Interior
U.S. Post Office & Court House
Boston, Mass. 02109

Mr. John A. Baker
District Chief
U.S. Geological Survey
150 Causeway Street
Boston, Mass. 02114

Mrs Barbara Fegan
Box 545
South Wellfleet, Mass. 02663

MERRIMACK WASTEWATER MANAGEMENT
INDEX TO REPORT VOLUMES

SUMMARY REPORT

APPENDICES

I. BACKGROUND INFORMATION

I-A GEOLOGIC-HYDROGEOLOGIC INVESTIGATIONS

I-B INDUSTRIAL LISTINGS

I-C LIST OF STUDY CRITERIA AND INSTRUCTIONS

II. PLAN FORMULATION

III. DESIGN AND COSTS (2 Volumes)

IV. IMPACT ANALYSIS AND EVALUATION

IV-A SOCIO-ECONOMIC IMPACTS

IV-B BIOLOGICAL IMPACTS (2 Volumes)

IV-C AESTHETIC IMPACTS

IV-D HYGIENIC-PUBLIC HEALTH

V. INSTITUTIONAL ARRANGEMENTS

VI. PUBLIC INVOLVEMENT PROGRAM

VII. COMMENTS

MERRIMACK WASTEWATER MANAGEMENT

(KEY TO A CLEAN RIVER)

APPENDIX I-C

LIST OF STUDY CRITERIA AND INSTRUCTIONS

November 1974

TABLE OF CONTENTS

A. INTRODUCTION

This study is a continuation of a previously authorized feasibility study titled "The Merrimack - Designs for a Clean River" dated September 1971. The feasibility study was one of six original pilot wastewater management studies assigned to the Corps of Engineers, Department of the Army, to be carried out in cooperation with the Environmental Protection Agency.

The Congressional and Senatorial authorizations for the survey scope study were received and some of the preliminary planning accomplished prior to the enactment of the Federal Water Pollution Control Act Amendments of 1972. In addition, much of the detailed planning had been completed prior to the finalization of the various guideline documents released by the Environmental Protection Agency.

Neither phase of the study was directed to be accomplished in accordance with any specific sections of PL 92-500, such as 201, facilities planning, 208 area-wide planning, etc. Also, it was not possible for the study to fully comply with the Act and its specific provisions within the study funds available ($900,000). As an example, an in-depth infiltration/inflow analysis study in the basin would require the full amount of study funds alone. Another example is the expense of a complete water sampling and analysis program. Such a program was estimated to cost at least $225,000 for the mainstem of the Merrimack River only. Furthermore, all compliance guidelines for sections of PL 92-500 were not available at the outset of the study.

In view of these constraints, it was felt that the study should address all criteria to the best extent possible and to provide an overall wastewater management plan which could be used as a master planning tool by the Commonwealth of Massachusetts.

B. LIST OF STUDY CRITERIA AND INSTRUCTIONS

The Merrimack Wastewater Management Study report is based on fulfilling the requirements of various criteria and instructions. In order to facilitate the review of the complete report, a list of the study requirements and where the applicable responses can be found are listed herein. The name of the more important documents containing requirements which are applicable to this study are:

United States Senate and Congressional Resolutions dated 2 May 1972 and 14 June 1972, respectively.

Agreement between the Department of the Army, Corps of Engineers and the Commonwealth of Massachusetts dated 27 November 1972.

Public Law 92-500 dated 18 October 1972 titled: Federal Water Pollution Control Act Amendments of 1972.

Summary of Requirements of 18 CFR 601.32 and 18 CFR 601.33 of the Federal Register, adopted 2 July 1970.

Corps of Engineers Brochure dated 1 May 1972 titled: Wastewater Management Program Study Procedure.

Merrimack River Basin Wastewater Management (Plan of Study) dated February 1973.

C. AUTHORIZING CONGRESSIONAL AND SENATORIAL RESOLUTIONS

Item	Appendix
1. Cooperate with the Commonwealth of Massachusetts in conducting a joint study to recommend improvements in Wastewater Management for that portion of the Merrimack Basin within the Commonwealth of Massachusetts and the Boston Metropolitan Area.	I
2. Consult with the Environmental Protection Agency in establishing the scope of work.	I
3. Incorporate the overall water resources and wastewater management implementation program previously determined by the Commonwealth of Massachusetts and approved by the Environmental Protection Agency.	I and II
4. Utilize the findings and recommendations of the New Hampshire Water Supply and Pollution Control Commission as published in the Commission's report titled: "Merrimack River Basin Plan," February 1972 and any amendments thereto.	I

D. AGREEMENT BETWEEN THE DEPARTMENT OF THE ARMY, CORPS OF ENGINEERS AND THE COMMONWEALTH OF MASSACHUSETTS

Item	Appendix
1. Jointly undertake a planning effort for wastewater management in the Merrimack River Basin, with expansion to the Boston Metropolitan Area.	I
2. Wastewater plans will aim at thorough elimination of pollutants through use of both basic and advanced treatment.	III Vol 1
3. The river basin planning requirements of the Environmental Protection Agency and the definitely committed portions of the Commonwealth of Massachusetts' pollution abatement program will be basic to an incorporated in the development of wastewater plans.	I and II
4. Major work items for plan development will be:	
a. An evaluation of the aim to achieve maximum water quality.	Summary Report
b. An evaluation of institutional alternatives appropriate for implementing the wastewater plan.	V
c. An evaluation of cost sharing alternatives appropriate to the wastewater plan.	Detailed cost sharing alternatives were not developed
d. Formulation of a total wastewater management system for the study area.	Detailed plans for control of non-point sources of pollution were not developed. Management systems for point sources of pollution are found in Appendix II.

e. Detailed planning of a limited number of system projects. These projects will be in addition to those currently under design as part of the Commonwealth's implementation program. — III Vol 2

5. Development of wastewater plans will be broadly coordinated with other Federal, State and local agencies in the study area with particular reference to the New England River Basins Commission. — I

6. Public involvement in plan development will be sought through an open planning process. Guidelines for this process are contained in "Open Planning/The Merrimack," September 1971. — VI

7. The planning effort will be conducted as a single operation composed of both Federal and State personnel and resulting in a joint report. — I

E. FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972

Item	Appendix
1. Section 201	
a. Best practicable technology to include reclaiming and recycling	III Vol 1
b. Ultimate disposal of residuals	III Vol 1
c. Encourage revenue producing facilities to address: recycling of pollutants for agriculture, aquaculture, etc. and reclaiming	II and III Vol 1
d. Multiple integration of systems such as solid wastes	III Vol 2
e. Open space and recreational considerations	IV-A and IV-C
f. Systems must provide for further technology at later dates.	III Vol 1
g. Cost effective analysis of alternatives considering advanced waste treatment	II and IV
h. Infiltration and inflow analysis studies	Not accomplished
i. Assessment of storm sewer and combined sewer problems and solutions	I and III Vol 2
j. Description and illustration(s) of alternatives	II
k. Evaluation and comparison of alternatives	IV
l. Cost, reliability and flexibility of alternatives	III Vols 1 and 2
m. Evaluation of existing and projected flows and wasteloads	I
n. Sludge disposal alternatives	III Vol 1
o. Public participation	VI
2. Section 208	
a. Land acquisition requirements	III Vol 1
b. Assessment of stormwater runoff and alternative solutions	III Vol 1
c. Analysis of financial structures and arrangements	Not accomplished
d. Display of costs and impact assessments	III Vol 2 and IV
e. Address control of non-point sources	IV-D and V

f. Control of residual wastes	III Vol 1
g. Inventory existing conditions and estimate future waste loads and flows	I
h. Analysis of appropriate institutional arrangements	V
i. Public participation	VI
j. Environmental, social and economic impact evaluation	IV

3. Section 303

a. Description of the basin	I
b. Inventory of sources of pollution	I and I-B
c. Segment priority ranking	State "303" Basin Plan
d. Schedules of compliance	State "303" Basin Plan
e. Assessment of municipal facility needs	State "303" Basin Plan
f. Assessment of non-point sources	IV-D
g. Residual waste controls	III Vol 1
h. Water quality standards revisions	State "303" Basin Plan
i. Appropriate monitoring and surveillance	State "303" Basin Plan

F. SUMMARY OF REQUIREMENTS OF 18 CFR 601.32 and 18 CFR 601.33 OF THE FEDERAL REGISTER

Item	Appendix
1. 18 CFR 601.32	
a. Identify all significant point sources of wastewater discharges; municipal, industrial, agricultural, etc.	I and I-B
b. Indicate the volume of discharge of each waste discharger	I-B
c. Indicate the character of the effluent of each waste discharge	I-B
d. A brief description of the effect of discharges and abatement practices upon the quality of the water in the basin and the proposed improvement effectiveness	IV-B
e. Furnish an abatement schedule for all waste discharges	Not accomplished
2. 18 CFR 601.33	
a. The plans should take into account anticipated growth in population and future uses of the area, utilizing integrated facilities, capabilities to treat stormwater, etc.	I and III Vol 1

G. CORPS OF ENGINEERS BROCHURE: WASTEWATER MANAGEMENT PROGRAM STUDY PROCEDURE

Item	Appendix
1. Identify and define geographic structure of study area	I
a. Climate	I
b. Geology	I
c. Topography	I
d. Natural resources	I
e. Physical resources	I
f. Biological resources	I and IV-B
g. Human resources	I and IV-A
h. Demographic characteristics	I
i. Cultural characteristics	I and IV-C
j. Land use	I and IV-A
k. Economic activity	I and IV-A
2. Identification of planning objectives	II and III Vol 1
3. Identification of existing technical systems	I
a. Systems presently in operation	I
b. Waste load conditions	I
c. Description of facilities	I
1) Geographical location	I
2) Size	I
3) Type of treatment	I
4) Characteristics of discharges	I
d. Identify existing systems where treated effluent or by-products can be made or are being used	II
4. Information necessary to determine reuse and multiple-use opportunities	II
a. Identify reuse opportunities	II
b. Multiple-use possibilities of:	
1) Renovated wastewater	II
2) Sludge	III Vol 1

3) Brines	III Vol 1
4) Land	IV-C
5) Right-of-ways	IV-C
6) Pipelines	IV-C
c. Water reuse considerations:	
1) Agricultural irrigation	II and III Vol 1
2) Industrial cooling	II
3) Acquifer recharge	II and III Vol 1
4) Flow augmentation	II
5) Recreational uses	II and IV-C
d. Sludge reuse considerations	III Vols 1 and 2
e. Institutional and governmental structures	V
1) Existing	V
2) Proposed	V
5. Forecast of future conditions	
a. Projected waste loads	I
b. Employment projections	I
c. Water-use projections	I
d. Water conservation trends	I
6. Evaluation	
a. Purpose and scope	IV
b. Methods of evaluation	IV
c. Impact assessment	IV
d. Measurement of effects	IV
e. Optimization of benefits	IV & Summary Report
f. Display of impacts	IV & Summary Report
7. Engineering and design	
a. Design requirements	III Vol 1
1) Consideration of flood plain	I
2) Consideration of standby power	III Vol 1
3) Use of existing systems as a base	I and II
4) Disposal of treatment sludges and gross solids	III Vol 1

5) Time phasing of systems	II and III Vol 1
6) Multiple-use concept of land	II
7) Flexibility for future expansion and/or upgrading	III Vol 1
b. System components	III Vol 2
1) Design for cost-effective systems	II
2) Wastewater treatment technologies	I and II Vol 1
3) Order of treatment unit processes in systems	III Vol 2
4) Compatibility of processes	III Vols 1 and 2
5) Phased replacement of major components in system due to deterioration, etc.	III Vol 2
6) Collection and conveyance systems	III Vol 2
7) Characterize sludges and treatment by-products	III Vol. 1
8) Climatic and soil conditions for land application	III Vol 1 and IV-B
9) Crop species consideration	III Vol 1 and IV-B
c. Level of design detail	III Vols 1 and 2
1) Technical goals and objectives	III Vol 1
2) Display detailed costs	III Vol 2
3) Base conditions of quality and quantity of effluent and existing facilities	II and IV-B
4) Proposed new facilities with necessary data thereto	II and III Vols 1 and 2
5) Additional transmission facilities required and data thereto	III Vols 1 and 2
d. Cost estimation	III Vol 2
e. Reliability of systems	III Vol 1
8. Institutions	
a. Purpose and scope	V
b. Institutional base data	V
c. Institutional analysis	V
1) Institutional requirements for each alternative and capability of existing institutions to meet those requirements	V

2) Alternative arrangements	V
3) Advantages and disadvantages of each alternative institutional arrangement	V
9. Development of alternatives	II
a. Basic concepts for system design	II and III Vol 1
b. Initial formulation phase	II
1) Alternate systems to achieve technical performance, highest level of treatment at minimum financial costs	II
2) Alternatives for:	
Advanced biological treatment	II and III Vol 1
Physical-chemical treatment	II and III Vol 1
Land treatment	II and III Vol 1
c. Modification phase	II
1) Reuse goals and planning objectives	II
2) Employment of non-structural elements	II
3) Combination of wastewater handling or separation	III Vol 2
4) Process and sequence of modifying initial alternatives	II
d. Detailing phase for selected projects	III Vol 2

H. MERRIMACK RIVER BASIN WASTEWATER MANAGEMENT PLAN OF STUDY

Item	Appendix
1. Public information, community relations and citizens participation	VI
a. Public participation program	VI
b. Public meetings	VI
c. Brochures and news letters	VI
d. Workshops	VI
2. Development of goals and objectives	I and Summary Report
a. Statement of the problem	I and Summary Report
b. Goals and planning objectives	I and Summary Report
3. Study area today	I
a. Inventory of present land use	I
b. Climatic dimensions	I
c. Geology	I
d. Hydrology	I
e. Biota	I and IV-B
f. Demographic and economic activity	I and IV-A
g. Inventory of present water use and waste loads	I
h. Inventory of present and planned water quality management projects and status	I
4. Study area tomorrow	
a. Projected land use under existing policies and trends	I
b. Projected changes in natural systems	I and IV-B
c. Future demographic and economic activity	I
d. Projection of future water use, waste loads and water quality	I
5. Description of wastewater treatment technologies	I

6. Industrial profiles and data	I-B
a. Inventory of major industries in the Merrimack River Basin-Massachusetts	I-B
b. Inhouse treatment versus treatment at municipal plants	III Vol 1
c. Costs	III Vol 1
7. Description of reuse potentials	
a. Use of renovated water	II
b. Uses for specific treatment process sludges	III Vols 1 and 2
c. Multiple use of system components	II
8. Checklist of land use guidelines	V
9. Checklist of potential impacts to basin areas	IV
a. Economic	IV-A
b. Social	IV-A
c. Environmental	IV-B
10. Alternative water quality management analysis and selection	
a. Alternative futures	Not accomplished
b. Wastewater management planning areas	I and II
c. Systems design criteria	III Vol 2
d. Alternative strategies for point and non-point sources	Point source management alternatives - II. Non-point source management strategies were not developed.
e. Evaluation and selection of final water quality management strategy	II and IV
1) Information for analysis	I and IV
2) Beneficial and detrimental impacts of alternative plans	III Vol 1 and IV
3) Performance of alternative plans	IV
4) Conclusions	IV
f. Environmental impact statement	Not accomplished

11. Administrative and regulatory systems for implementation

a. Institutional arrangements	V
b. Land use controls	V
c. Financial arrangements	Not accomplished
d. Needs for new legislative authority	V
e. Implementation	Summary Report